

What is Claimed is:

1. A system for guiding a device toward an object comprising:
means for generating a guidance command signal from: a vectored
line-of-sight (LOS) between a device and an object using a position parameter of
the object relative to a guidance frame, and an estimated object state produced in
5 the guidance frame using the vectored line-of-sight; and
means for transmitting the guidance command signal to an on-board
guidance control of the device.
2. A system for guiding a device toward an object in accordance with
10 claim 1, wherein the means for generating a guidance command signal creates an
estimated object to device range vector, an estimated object to device velocity
vector and an estimated object acceleration vector.
3. A system for guiding a device toward an object in accordance with
15 claim 2, wherein the means for generating a guidance command signal creates an
estimated object acceleration rate vector.
4. A system for guiding a device toward an object in accordance with
claim 1, wherein the means for generating a guidance command signal is
20 periodically adaptive.

5. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal comprises:

5 means for generating a set of probability weights.

6. A system for guiding a device toward an object in accordance with claim 5, wherein the sum of the probability weights for any axis of the guidance frame is unity.

10

7. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal uses sequential line-of-sight (LOS) vectors in the guidance frame.

15

8. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal comprises:

at least one Kalman filter bank.

9. A system for guiding a device toward an object in accordance with claim 8, wherein the at least one Kalman filter bank is harmonically balanced.

20

10. A system for guiding a device toward an object in accordance with claim 9, wherein each of the at least one Kalman filter bank is associated with a
5 respective axis in the guidance frame.

11. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal comprises:
a proportional navigation controller.
10

12. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal comprises;
an augmented proportional navigational controller.

13. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal comprises:
a classical optimal controller.
15

14. A method for guiding a device toward an object comprising the steps of:
20 creating a vectored object line-of-sight (LOS) in a guidance frame;
producing an estimated object state, using sequential object LOS;

using proportional navigation control to create a device guidance
command as a function of an estimated range vector and an estimated velocity
5 vector obtained using the estimated object state.

15. A method for guiding a device toward an object in accordance with
claim 14, wherein the estimated object state is adaptively produced.

10 16. A method for guiding a device toward an object in accordance with
claim 15, comprising the steps of:
creating a periodically adaptive guidance command using estimated
object state; and,
adding the periodically adaptive guidance command to the device
15 guidance command.

17. A method for guiding a device toward an object according to claim
15, wherein the step of creating a device guidance command comprises the step
of:
20 creating a guidance command operating on device acceleration to
compensate for autopilot lag.

18. A method for guiding a device toward an object according to claim
16, wherein the step of creating an periodically adaptive guidance command
5 comprises the step of;
using a function of object maneuver frequencies, time-to-go before
intercept, maneuver frequency correlation time constants, estimated target
accelerations and estimated object acceleration rates.

10 20. A method for guiding a device toward an object in accordance with
claim 14, wherein the step of creating a vectored object line-of-sight comprises the
steps of:

- a) obtaining azimuth, elevation and range information of an
object;
- 15 b) using the azimuth, elevation and range information for vectored
LOS reconstruction to create a unit vector representative of the object's orientation
in a guidance frame of the device; and,
- c) applying the range information to the output of the vectored
LOS reconstruction to create the estimated range.

20

21. A method for guiding a device toward an object in accordance with
claim 20, wherein the step of producing an estimated object state comprises the
step of:

processing plural sequential estimated range vectors into an object state estimator in an inertial guidance frame estimated object state, wherein the
5 estimated object state can include range, velocity, object acceleration and object acceleration rate.

22. A guidance system for guiding a device toward an object comprising:
means for generating a signal representing a predicted position of
10 the object from: object position parameters relative to a guidance frame and a periodically adaptive estimated object state produced in the guidance frame using the object position parameters; and,
means for transmitting the signal to an on-board guidance control of the device.

15

23. A guidance system for guiding a device toward an object according to claim 22, comprising;

a fire control platform

wherein the means for generating a signal representing the predicted
20 position of the object is located on the fire control platform, and the fire control platform is remote from the device.

24. A method for guiding a device toward an object comprising the steps of:

5 obtaining object position parameters;
 periodically adaptively producing an estimated object state;
 creating a predicted position from the estimated object state; and,
 determining a guidance command from the predicted position of the
object.

10 25. A method for guiding a device toward an object according to claim 24
comprising the steps of:

 transmitting the predicted position of the object from a remote
location to the device;
 wherein the step of determining a guidance command is performed
15 on the device.

26. A method for guiding a device toward an object according to claim
24, comprising the steps of;

 obtaining device position parameters;
20 determining at a remote location a time-to-intercept; and,
 transmitting the time-to-intercept from the remote location to the
device.